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JULY 7, 2005

COMMISSIONER FOR PATENTS
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Re: Patent Application of Alexander VON WEYMARN-SCHARLI
Serial No. 10/530,455 Filing Date: April 5, 2005
Examiner: Group Art Unit:
Docket No. A013-5480(PCT)

S I R:

The above-identified application was filed claiming the right of priority based on the following foreign application(s).

1. Swiss Patent Appln. No. **1712/02** filed **October 15, 2002**
2. Swiss Patent Appln. No. **1083/03** filed **June 20, 2003**

Certified copy(s) are annexed hereto and it is requested that these document(s) be placed in the file and made of record.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Applicant(s)

By: _____
Bruce L. Adams
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MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

Debra Buonincontri
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Almag-Institut

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CERTIFICATION OF TRANSLATION

The above-named Translation Institute hereby certifies that the translation from German into English of the following document:

Patent Applicant and Inventor:	Dr. med. Alexander von Weymarn-Schärli Thiersteinerrain 110, CH-4059 Basel
Title of Patent:	Guide Wire Especially for the Positioning of Catheters in a Body Cavity
Swiss Registration Number:	01712/02
Swiss Registration Date:	15 October 2002

agrees with the contents of the original and has been performed to the best of our knowledge and intention.

The translation has been provided with our company stamp and signed by us on behalf of the company with the date of 8 February 2005.

Zurich, 8 February 2005/ha
(1193 A2 141/A)
(05/5015)

MB No C11-12 IBM

ALMAG-INSTITUT

H. Merkler, dipl. Ing. ETH

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Official Certification

Seen for the authentication of the above signature of

Mr. Hugo MERKLER, born on May 7, 1943, Swiss citizen of Dietikon ZH and Horn TG, residing at Rainstrasse 5, 8103 Unterengstringen, (personally known to us),

who, according to the extract shown to us from the Commercial Register of the Canton of Zurich dated December 3, 2004, is registered as sole proprietor with individual signature for the

ALMAG-INSTITUT, H. Merkler, dipl. Ing. ETH, having its registered domicile in Zurich.

The signature has been acknowledged in our presence by the authorized agent, Mrs. Natalie Bieri, born on December 28, 1985, Swiss citizen of Schangnau (BE), residing at Espelstrasse 6, 8308 Illnau (ZH)

Altstetten-Zurich, February 8, 2005
B No. 843
Fee: SFr. 30.--

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Walter Wieland
Notariatsinspektor mbA

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SWISS CONFEDERATION

Certification of Conformity

It is hereby certified that the enclosed records are in exact conformity with the original technical documentation of the **patent application for Switzerland** and Liechtenstein designated on the next page. Switzerland and the Principality of Liechtenstein form a single territorial scope of protection. Consequently, application for protection can be made for both countries jointly.

Bern, Switzerland, this 5th day of January 2005

Swiss Federal Institute for Intellectual Property

Patent Applications Department Heinz Jenni

Patent Application No. 01712/02

FILING RECEIPT (Art. 46 Para. 5 Patent Ordinance)

The Swiss Federal Institute for Intellectual Property herewith certifies the receipt of the application for a Swiss patent described in detail below.

Title of the patent application:

Guide Wire Especially for the Positioning of Catheters in a Body Cavity

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Application date: 15. 10. 2002

Prospective classes: A61M

Guide Wire Especially for the Positioning of Catheters in a Body Cavity

The invention relates to a guide wire in particular for the positioning of catheters in a body duct in compliance with the title of Patent Claim 1.

The problem is addressed in WO 02/34324 A2, in which guide wires connect a section made of a superelastic material with a section made of steel which is significantly stiffer than the first-mentioned section. The guide wire known from WO 00/40288 A1 has a shapable body on its distal section, the flexibility of which is changed continuously and should retain its shapable characteristics.

The problem that the guide wire tends to be moved during the withdrawal of the catheter is addressed in EP 0 714 315 B1. The guide wire revealed here is designed in such a way that its movement is clearly recognizable visually.

The guide wire described in DE 200 19 484 U1 exhibits basic non-ferromagnetic bodies at regular intervals. They are furnished with minimum quantities of ferromagnetic particles, whereby the guide wire consists of a hollow cylindrical tube made of a non-ferromagnetic material such as plastic, for example. It contains a cylindrical carrier which is marked with clusters of ferromagnetic particles at regular intervals. This guide wire is especially suitable for processes controlled through magnetic resonance tomography.

A filter fixture which catches embolic material in a blood vessel and also envelopes a guide wire is known from DE/EP 0 980 278 T1. A guide wire with a core wire which comprises a multiple of thinner threads twisted with each other is described in EP 0 826 389 B1.

A guide wire which exhibits an outer tube which is shaped from a flexible material without restoring force is known from EP 0 823 261 A2. Furthermore, the guide wire has an inner core wire which can be moved back and forth in the outer tube. The core wire has a distal end which, although it is flexible on the one side, exhibits a

return force on the other side, but in certain manner such as that if possible the distal end protrudes bent in a prescribed manner especially at the distal end of the outer tube. For this purpose, the distal end of the outer tube is formed very flexibly.

A guide wire unit is described in EP 0 778 044 A2. A sensor unit in a hollow, flexible component such as a hollow tube can slide into it in order to stiffen the flexible components. The sensor unit has a flexible sensor sleeve and an inner sensor wire, whereby the distal end of the latter is bent in advance in a certain manner. The sensor unit serves, for example, to stiffen an electrode cable during the insertion of the cable through a vein to the heart of the patient.

A guide wire in accordance with the title of Patent Claim 1 is known, for example, from DE 100 17 147 A1. This guide wire consists of an outer wire thread which is shaped as a hollow thread as well as an inner thread which can be moved inside it. The wire thread has a curved guide tip at its distal end. It acts as a control element or pathfinder during the insertion of the guide wire.

The guide wires mentioned are introduced into a body duct, for example, in a vessel such as a vein or artery so that a catheter can later be pushed along the guide wire. Different, narrow branches are to be entered with the guide wire, whereby the relatively stiff catheter is to be introduced afterwards. In the case of the last-mentioned guide wire, the curvature is prescribed at its distal end, so that the corresponding pre-shaped guide catheter with the correct curvature is to be selected. The diameter of such a guide catheter is relatively large as it is used as an outer guide. In the second step, the actual therapy catheter, for example, a balloon catheter, is to be pushed in later through the hollow of the guide catheter. The external guide catheter is relatively thick in the forward area because of its curvature. Furthermore, there is the danger that the forward part of the guide wire can slip out of the intended vessel at a branch of the vessel when inserting a relatively rigid therapy catheter without the use of a guide catheter.

The invention is based on the task of creating a guide wire of the kind mentioned at the beginning, which can be handled easily and is, above all, adequately flexible on one side, but also adequately stiff on other side.

This task is solved in accordance with the invention through a guide wire with the characteristics of Patent Claim 1. Advantageous further designs are the object of the dependent claims.

In accordance with the invention, a fixture is connected to the wire threads, through which the possibility to permit relative motion between the wire threads or at least to make it difficult can be controlled purposefully. It can therefore also be possible, with the help of the previously-named control fixture, to make relative motion between the wire threads very difficult or to prevent it. If relative motion between the wire threads is prevented with the help of the control fixture, it finally serves to reinforce the entire guide wire so that, for example, a relatively rigid therapy catheter can be pushed over the guide wire afterwards without taking the risk of the guide wire slipping out of the intended vessel. By increasing the friction, it is possible to make relative motion between the wire threads more difficult or to prevent it entirely. As a result, the guide wire in accordance with the invention can be handled more easily. It is adequately flexible when relative motion between the wire threads is permitted and is adequately stiff when the relative motion between the wire threads is made more difficult or prevented.

In accordance with a further design, the control fixture is finished in such a way that magnetic fields of different polarities can be generated along the first wire thread and along the second wire thread to cause mutual attraction of the wire threads at will. This has the advantage that the individual wire threads and thereby the guide wire is extremely flexible on the whole as long as no magnetic field is generated while the guide wire on the other hand is adequately stiff through the mutual attraction of the wire threads when the magnetic fields are generated. In this way, the guide wire in accordance with the invention is adequately flexible on the one hand, for example, for the introduction of the wire into a body duct and on the other hand adequately stiff when sliding the catheter along it afterwards, especially in the area of a branch of the

vessel, so that the danger that the guide wire can slip out of the intended vessel is extensively excluded. Such a guide wire therefore combines two rather contradictory characteristics, namely adequate flexibility on the one hand and adequate stiffness on the other hand, depending upon which characteristic is desired precisely during the handling of the guide wire.

It is an advantage if the first wire thread and/or the second wire thread is made of a magnetizable material, especially from a weakly magnetizable material. It is possible through this to build up the magnetic fields as desired and also to be able to reduce them again depending upon the flexibility or stiffness which is necessary for the guide wire in the practical application. In accordance with another further design of the invention, the first wire thread and/or the second wire thread is made of a non-magnetizable material and provided with a magnetizable coating, through which every individual wire thread can be manufactured from a variety of materials to be selected. It is accordingly not necessary to manufacture the entire wire thread out of magnetizable material. It can rather be adequate to provide only the outer jacket of a wire thread with a magnetizable coating so that such a wire thread is also magnetizable.

In accordance with an advantageous further design of the invention, the first wire thread and/or the second wire thread is finished as a solid body or as a hollow body. In the case that both wire threads are formed as hollow bodies, the control fixture preferably exhibits a magnetizable liquid which is found in every wire thread. In the last-mentioned case, the hollow body of every wire thread can consist completely of non-magnetizable material as the mutual attraction of the wire threads can be caused through the magnetizable liquid found in each hollow body.

It is an advantage if the previously-described magnetic fields can be generated through electrical currents, meaning through the application of an electrical voltage to the wire threads. The magnetic fields can then be generated on the basis of electric fields through simple switching of the electrical voltage on and off respectively. The magnetic fields can be generated electromagnetically or simply, as previously-mentioned, with the help of an electric current which flows through a conductor. The

electrical fields and thereby also the magnetic fields can therefore be increased and decreased extremely quickly. An electrical voltage can be applied directly to the guide wire in a simple manner and without an intrusion into the body to be examined so that negative effects on the human or animal bodies to be examined are extensively excluded.

In accordance with a further design of the invention, the wire threads are arranged beside each other and parallel to each other, preferably twisted with each other. In an especially space-saving arrangement, the wire threads are arranged concentrically to each other, whereby one of the wire threads is preferably arranged centrally on the inside and the other wire thread is arranged in the shape of a spiral, radially to the outside, around the first one. A spiral-shaped outer wire thread contributes to especially good flexibility of the guide wire, so that the latter, for example, can be bent with a relatively small radius.

In accordance with a preferred further design of the invention, the first wire thread is arranged centrally on the inside and several second wire threads are arranged around the outer circumference of the first wire thread, preferably uniformly spaced from each other. In this way, good flexibility of the guide wire is established and, on the other side, adequate stiffness of the guide wire is then established if the first wire thread and the second wire thread attract each other mutually.

It is an advantage if the wire threads are shaped in such a way that they lie flat against each other when a magnetic/electrical field is generated to produce mutual attraction. In this way, good contact is enabled between the wire thread and relative movement between the wire threads is extensively prevented with the fields at work, through which the stiffness of the entire guide wire in the present curvature found in the body is improved.

In accordance with another further design of the invention, the magnetic fields can be generated permanently magnetically, whereby preferably every wire thread is polarized along its length and alternating oppositely in the radial direction. This form of implementation has the advantage that mutual attraction or repulsion respectively

of the individual wire threads can be realized through a simple displacement of the wire threads relative to each other in the axial direction. As the polarization changes continuously along every wire thread, a slight axial displacement of the wire threads relative to each other can already cause the desired repulsion or attraction.

It is advantageous if the control fixture can enable a mutual contact or attachment of the basic surfaces of the wire threads facing each other preferentially in the form of teeth and a separation of the basic surfaces from each other through the introduction of a fluid under pressure, preferentially a liquid or a gas, in the gaps between the wire threads. It is possible to increase the friction between such surfaces strongly and thereby to extensively prevent relative movement between such wire threads through mutual contact or attachment of surfaces of the wire threads facing each other. On the other side, the guide wire can be extremely flexible when the surfaces are separated from each other through the previously-named measures.

In accordance with a preferred further design of the invention, the mutual contact or attachment of the surfaces of the wire threads facing each other can be brought about through the removal of the fluid, preferably with the additional application of a vacuum. In this way, it is ensured that the individual wire threads, also after frequent use of the guide wire, lie closely against each other and can thereby contribute to preventing relative movement between the wire threads. Under certain circumstances, this effect can already be achieved through the application of a vacuum to achieve mutual contact between the surfaces of the wire threads facing each other, without requiring a certain treatment or the provision of teeth on the basic surfaces facing each other.

Examples of the implementation of the object of the invention are explained more closely in the following with the help of the drawings, whereby all characteristics described and/or presented graphically comprise the object of the present invention by themselves or in any desired combination independently of their summary in the claims reference to them. The following are shown:

Fig. 1 A schematic, highly enlarged cross-section through a guide wire, in particular for the positioning of catheters in a body duct, in accordance with a first form of implementation;

Fig. 2 A schematic, highly enlarged cross-section through a guide wire, in accordance with a second form of implementation;

Fig. 3 A schematic, highly enlarged cross-section through a guide wire, in accordance with a third form of implementation;

Fig. 4 A schematic top view of a guide wire in accordance with Fig. 3, in which the two wire threads are represented spaced apart from each other;

Fig. 5 A schematic top view of the guide wire drawn in Fig. 3, in which the two wire threads are presented spaced apart from each other and displaced relative to each other;

Fig. 6 A schematic cross-section through a guide wire in accordance with a further form of implementation;

Fig. 7 A schematic cross-section through a guide wire in accordance with another form of implementation;

Fig. 8 A schematic cross-section through a guide wire in accordance with a further form of implementation.

At first, it is to be noted that the shading symbolizing a cross-section has been omitted in Fig. 1 through 3 as well as Fig. 6 for better overview and that the term "wire" is used here in a general, comprehensive sense for a long, thin body of any particular material.

Cross-sections through various forms of implementation of a guide wire 1 in particular for the positioning of catheters not drawn more closely in a body duct not presented

are presented in Fig. 1 through 3 as well as Fig. 6 through 8. The catheters are, for example, tubes made of metal, glass, plastic or rubber for introduction into body organs, such as, for example, the gall bladder, in order to drain, fill, rinse or examine the latter. The body duct is, for example, a vessel of a human or animal body, such as, for example, a vein or an artery.

The guide wire 1 has a lengthwise first wire thread 2 and at least one lengthwise second wire thread 3 which runs near the first wire thread 2. In the example in accordance with Fig. 1, there are 11 second wire threads 3, in the example in accordance with Fig. 2 three second wire threads 3, in the example in accordance with Fig. 3 one second wire thread 3, in the example in accordance with Fig. 6 three wire threads 3, in the example in accordance with Fig. 7 one second wire thread 3, and in the example in accordance with Fig. 8 two second wire threads 3.

In accordance with the invention, a fixture 8 is connected to the wire threads 2 and 3. Through it, the possibility to permit relative movement between the wire threads 2 and 3 or at least to make it more difficult can be controlled purposefully. This fixture 8 is called the control fixture in the following.

The control fixture 8 is finished in such a way that magnetic fields 4 of different polarity 5 can be generated along the first wire thread 2 on the one side and along the second wire thread 3 on the other side to bring about a mutual attraction of the wire threads 2 and 3 at will. The fields 4 or forces which can be built up or decreased respectively are indicated only schematically in Fig. 1 through 8, whereby it is clear that fields of this kind exist between every first wire thread 2 and every second wire thread 3 provided that these fields are generated. The different polarity 5 of a first wire thread 2 and a second wire thread 3 is, for example, shown through the identification mark "+" or "-" in Fig. 1 and 2 as well as Fig. 7 and through the letters "N" and "S" in Fig. 3 through 6, whereby "+" and "-" stand for positive and negative electrical charges respectively and "N" for the north pole and "S" for the south pole of a magnetic field.

In accordance with one form of implementation, the first wire thread and the second wire thread or the first wire thread or the second wire thread is manufactured of a magnetizable material, in particular a weakly magnetic material. In accordance with another form of implementation, the first wire thread and the second wire thread or the first wire thread or the second wire thread is manufactured of a non-magnetizable material and provided with amagnetizable coating 7 on its surface, whereby it is possible to apply the coating only in the areas of wire threads 2 and 3 which face toward the other wire thread in each case. These are, for example, the basic surfaces 6 of the cylinder segment-shaped second wire threads 3 in the case of the form of implementation in accordance with Fig. 2. The magnetizable coating 7 can be provided on the basic surfaces 10 of the cylinder halves 11 and 12 in the example in accordance with Fig. 3.

In accordance with the examples presented, the first wire thread 2 and/or the second wire thread 3 is shaped as a solid body (see Fig. 1 through 3 and Fig. 6) or as a hollow body (see Fig. 7 and 8 with respect to the second wire thread 3).

In accordance with a form of implementation of the invention not presented, it is possible, in the case that both wire threads are shaped as hollow bodies, for a magnetizable fluid to be present in each wire thread so that mutual attraction of the wire threads arranged beside each other or arranged concentrically inside each other is possible with the application of magnetic fields. A magnetizable fluid is, for example, a colloidal, especially a stabilized suspension of magnetic or magnetizable particles. Most often, particles of about 10 nm are used. They are prevented from grouping together under the effects of the magnetic interactions by enveloping them with a surface-active substance such as oleic acid, for example. Water, but also oils and various other solvents can serve as a carrier fluid. A magnetizable fluid can be held fixed in every position through a magnetic field. This technical effect can also be used to stiffen a guide wire.

The magnetic fields 4 can be generated through the application of a not-shown electrical voltage on wire threads 2 and 3 or on the magnetizable coating 7 respectively.

The wire threads 2 and 3 are arranged beside each other and parallel to each other in accordance with Fig. 1 through 6. In Fig. 6, a schematic cross-section is shown through a further form of implementation of a guide wire 1, in which the form of implementation in accordance with Fig. 3 is cut in half once again, so that the individual wire threads 2 and 3 are also located beside each other and parallel to each other in this form of implementation.

In accordance with a form of implementation not shown more closely, it is also possible to twist the wire threads 2 and 3 around each other.

In accordance with the form of implementation shown in Fig. 7, the wire threads 2 and 3 are arranged concentrically with each other, whereby the first wire thread 2 is found centered within the second wire 3 which is shaped as a hollow body.

In accordance with a further form of implementation of the invention not shown more closely, one of the wire threads, for example, the first wire thread 2, is placed centrally on the inside and the other wire thread, for example, the second wire thread 3, is arranged spirally around the first, located radially to the outside.

As indicated in the form of implementation shown more closely in Fig. 1, the first wire thread 2 is arranged centrally on the inside and provided with a circular-shaped cross-section. Several second wire threads 3 are located around the outer circumference of the first wire thread 2, spaced equally from each other in the example selected. As an example, in the case of the form of implementation in Fig. 1, eleven second wire threads 3 are foreseen. They also exhibit a circular-shaped cross-section in each case, whereby the diameter of the first wire thread is selected significantly larger than that of the second wire threads 3 and the spacing of the particular second wire threads 3 from the first wire thread 2 is significantly smaller than that to the neighboring second thread 3.

In the form of implementation shown in Fig. 2, the first wire thread 2 has a cross-section in the form of an equilateral triangle, while the basic surface 6 of every one of the second wire threads 3 in this example of implementation is shaped in such a way

that the width of the basic surface 6 corresponds approximately to the length of one of the sides of the triangle of the cross-section of the first wire thread in the form of an equilateral triangle. The second wire threads 3 are shaped partly cylindrically or as segments of cylinders. The wire threads 2 and 3 in accordance with the forms of implementation in Fig. 1 and 2 are furthermore surrounded by an outer sleeve which is only indicated in dashed lines in Fig. 1.

In the form of implementation presented in Fig. 3, the first wire thread 3 and the second wire thread 2 are shaped approximately identically with each other and shaped as half-cylinders.The two halves of the cylinder 11 and 12 thereby produce a circular-shaped cross-section in their assembled or pressed together condition. In this case, the individual wire threads 2 and 3 are also enveloped preferably by an outer sleeve 13.

In accordance with the forms of the invention presented in Fig. 3 through 6, the magnetic fields 4 can be generated within each wire thread and also from one wire thread to the other permanently magnetically, whereby, as shown in detail in a top view in Fig. 4 of the guide wire 1 in accordance with Fig. 3, in which the individual wire threads are nevertheless separated from each other, each wire thread 2 and 3 is alternately oppositely polarized along its length and in the radial direction. A mutual attraction of the wire threads 2 and 3 results from this with the axial arrangement of the wire threads 2 and 3 in accordance with Fig. 4 as this is emphasized through the arrows A directed at each other in Fig. 4.

If the second wire thread 3 is now moved in the direction of arrow B relative to the first wire thread 2 in the axial direction as indicated in Fig. 5, the wire threads 2 and 3 repel each other as the same polarities lie opposite each other in the wire threads. This is emphasized by the arrows C directed away from each other in Fig. 5. It is clear that the effect of the repulsion of the wire threads shown in Fig. 5 can also be achieved beginning with the arrangement in accordance with Fig. 4 in such a way that the first wire thread 2 is moved relative to the second wire thread 3 in the axial direction.

In the form of implementation shown in Fig. 6, the individual wire threads 2 and 3 have the shape of quarter cylinders and are almost identically shaped, so that four wire threads facing each other and touching each other produce a circular cross-section. In this form of implementation, the individual polarities are also emphasized through the abbreviations "N" and "S" with the magnetic fields 4 which run within each wire thread, but then also from one wire thread to the other.

The individual wire threads 2 and 3 could also be moved relative to each other in the axial direction analogous to the form of implementation illustrated in Fig. 4 and 5 through which, as indicated in Fig. 5, the same polarities can result in wire threads located opposite each other so that the wire threads repel each other. In this respect, the wire threads 2 and 3 in the forms of implementation of Fig. 3 through 6 are shown in the form of permanent magnets.

In the case of another example, the wire threads 2 and 3 can also exhibit a circular-shaped cross-section in each case and be arranged beside each other (not shown), whereby the surfaces of these wire threads facing toward each other can also be finished in such a way that not a line-shaped contact, but rather a surface contact of the wire threads is possible in case of mutual attraction of the wire threads.

It is clear that the relative spacing of the first wire threads to the second wire threads as well as the second wire threads to each other, if several are available, are represented highly enlarged relative to each other in Fig. 1 through 8 and that especially with the examples of implementation in Fig. 1 and 2, the outer sleeve 13 can also lie closely on the second wire threads 3.

In the form of implementation of the invention shown in Fig. 7, the first wire thread 2 has a circular-shaped cross-section and is located in the second wire thread 3, which is finished with the shape of a pipe with a ring-shaped cross-section area. With this form of implementation as well, it is clear that the spacing shown between the first wire thread 2 and the second wire thread 3 is highly enlarged and that in practice the outside diameter of the first wire thread 2 is only slightly smaller than the inside

diameter of the second wire thread 3. If desired, a lubricating fluid can also be located in the ring-shaped interior cavity 14 between

the first wire thread 2 and the second wire thread 3. But, it is also possible to do without such a lubricating fluid.

A further form of implementation of the guide wire 1 is presented in a schematic cross-section in Fig. 8. Three wire threads, namely a first wire thread 2 and two second wire threads 3 which have approximately identical cross-sections are located in the outer sleeve 13. In this form of implementation, the control fixture 8 is finished in such a way that it enables mutual contact or attachment of the basic surfaces 10 facing each other, preferably in the form of teeth indicated only schematically in Fig. 8, for example, in the form of fine little hairs located on the basic surfaces of the wire threads 2 and 3 facing each other and that a separation of the basic surfaces 10 from each other is enabled through the introduction of a fluid, preferably a liquid or gas, under pressure into the gap 16 between the wire threads 2 and 3. The fluid can equally well be introduced into the ring-shaped inner chamber 14 between wire threads 2 and 3 and the outer sleeve 13. The mutual contact or attachment of the basic surfaces 10 of the wire threads 2 and 3 facing each other and finished as a partial cylindrical form can be brought about, for example, through the removal of the fluid, preferentially with the application of a vacuum in addition.

In the case of the forms of implementation shown in Fig. 2 through 7, the wire threads 2 and 3 are shaped in such a way that they contact each other with their surfaces and can thereby contribute to an outstanding possibility of stiffening the guide wire 1 with the generation of a magnetic field 4. It is clear that the first wire thread 2 and the second wire thread 3 can be charged positively or negatively to generate the magnetic fields which are necessary to bring about a mutual attraction of the wire threads. The stiffening of the guide wire 1 is achieved through the mutual attraction of the wire threads. Such a stiffening is possible in the particular position of the guide wire which the wire assumes just then in the particular body duct.

The guide wire 1 has the ability not to twist without further ado; it is therefore torsion-rigid. It furthermore exhibits a resistance to bending, the ability to push and not to kink. It is adequately flexible and can slide. It has a diameter, for example, of 0.9 or 1 mm. In this way, the guide wire in accordance with the invention can be handled without having to make a larger additional hole with respect to the cross-section of the guide wire. Furthermore, there is extensive flexibility with respect to the materials selected for the wire threads of the guide wire. All usual catheters can be used with the guide wire in accordance with the invention. Handling is safe and simple.

The guide wire in accordance with the invention can, as mentioned, be used in particular for the positioning of catheters in a body duct. It is also possible to use such a guide wire in industrial engineering where thicker guide units can be used if necessary. This means exploration borings or deep sea borings amongst other things (e.g. for the production of oil) or operations in weightlessness, where the stiffening of a guide can also be useful.

In this way, a guide wire which is adequately flexible on the one hand but also adequately stiff on the other hand has been created so that the guide wire in accordance with the invention can be handled easily.

Patent Claims

1. Guide wire in particular for the positioning of catheters in a body duct with a long first wire thread (2) and at least one long second wire thread (3) which runs close to the first wire thread (2), **characterized by the fact that** a fixture (8) connected to the wire threads (2, 3) with which the possibility to permit relative movement between the wire threads (2, 3) or at least to make it more difficult can be controlled purposefully.

2. Guide wire in accordance with Claim 1, **characterized by the fact that** the control fixture (8) is finished in such a way that magnetic fields (4) of different polarities (5) can be generated along the first wire thread (2) and along the second wire thread (3) to bring about a mutual attraction of the wire threads (2, 3) at will.

3. Guide wire in accordance with Claim 1, **characterized by the fact that** the first wire thread (2) and/or the second wire thread (3) is manufactured from a magetizable material, especially a weakly magnetizable material or that the first wire thread (2) and/or the second wire thread (3) is manufactured from a non-magnetizable material and is provided with a magnetizable coating (7).

4. Guide wire in accordance with one of the previous Claims, **characterized by the fact that** the first wire thread (2) and/or the second wire thread (3) is shaped as a solid body or as a hollow body, whereby in the case that both wire threads (2, 3) are shaped as hollow bodies, the control fixture (8) preferably exhibits a magnetizable fluid found in each wire thread (2, 3).

5. Guide wire in accordance with one of the previous Claims, **characterized by the fact that** the magnetic fields (4) can be generated through the application of electric voltage to the wire threads (2, 3).

6. Guide wire in accordance with one of the previous Claims, **characterized by the fact that** the wire threads (2, 3) are arranged beside each other and parallel to each other,
preferably twisted around each other, or that the wire threads (2, 3) are arranged concentric to each other, whereby preferably one of the wire threads (2, 3) is arranged centrally on the inside and the other of the wire threads (3, 2) is arranged spirally, radially to the outside around the first wire thread.

7. Guide wire in accordance with Claim 6, **characterized by the fact that** the first wire thread (2) is arranged centrally on the inside and several second wire threads (3) are arranged around the outer circumference of the first wire thread (2), preferably uniformly spaced from each other.

8. Guide wire in accordance with one of the previous Claims, **characterized by the fact that** the wire threads (2, 3) are finished in such a way that they lie flat against each other with the generation of a magnetic field to bring about mutual attraction.

9. Guide wire in accordance with one of the previous Claims, **characterized by the fact that** the magnetic fields (4) can be generated permanently magnetically, whereby preferably each wire thread (2, 3) is polarized along its length and alternately oppositely in the radial direction.

10. Guide wire in accordance with one of the previous Claims, **characterized by the fact that** the control fixture (8) enables mutual contact or attachment to each other of the basic surfaces (6, 10) of the wire threads (2, 3) facing each other, preferably in the form of teeth (15) and enables the separation of the basic surfaces (6, 10) from each other through the introduction of a fluid under pressure, preferably a liquid or a gas in the gap (16) between the wire threads (2, 3).

11. Guide wire in accordance with Claim 10, **characterized by the fact that** the mutual contact or attachment of the basic surfaces (6, 10) of the wire threads (2, 3) facing each other can be brought about through the removal of the fluid, preferably with the additional application of a vacuum.

Summary

The invention relates to a guide wire (1) in particular for the positioning of catheters in a body duct. The guide wire (1) has a long first wire thread (2) and at least one long second wire thread (3) which runs near the first wire thread (2). In accordance with the invention, the guide wire (1) has a fixture (8) connected to the wire threads (2, 3) through which the possibility to permit relative movement between the wire threads (2, 3) or at least to make it difficult can be controlled purposefully.

The control fixture (8) is, for example, finished in such a way that magnetic fields (4) of different polarities (5) can be generated along the first wire thread (2) and along the second wire thread (3) to bring about mutual attraction of the wire threads (2, 3) at will for the stiffening of the guide wire (1).

(Fig. 1)

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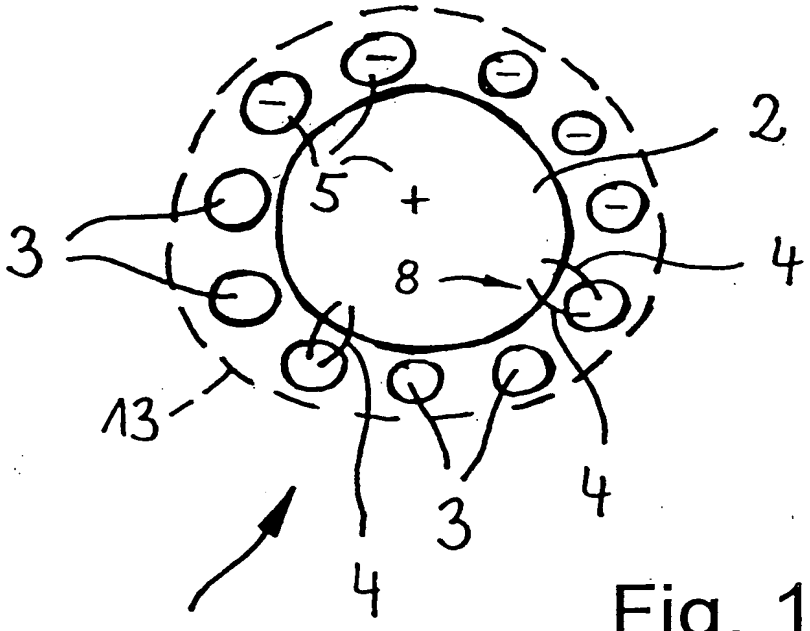

Fig. 1

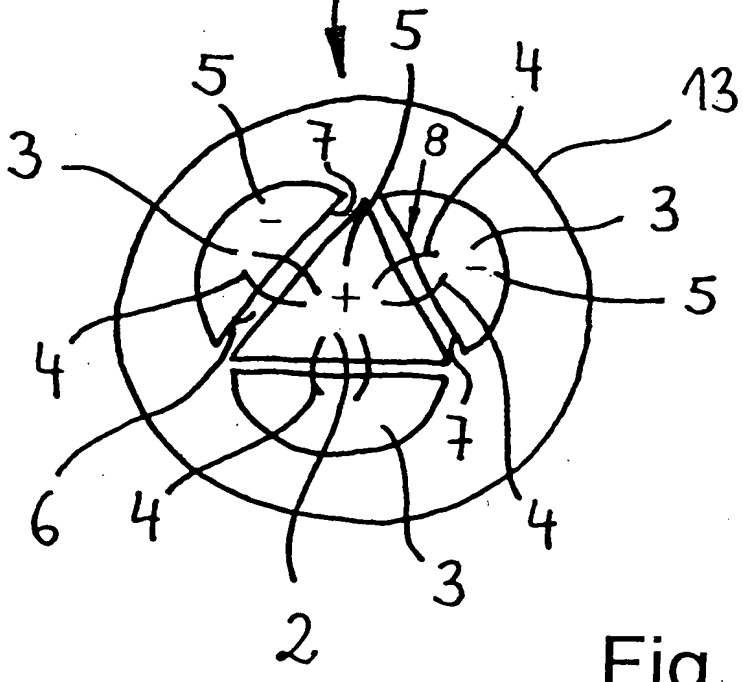

Fig. 2

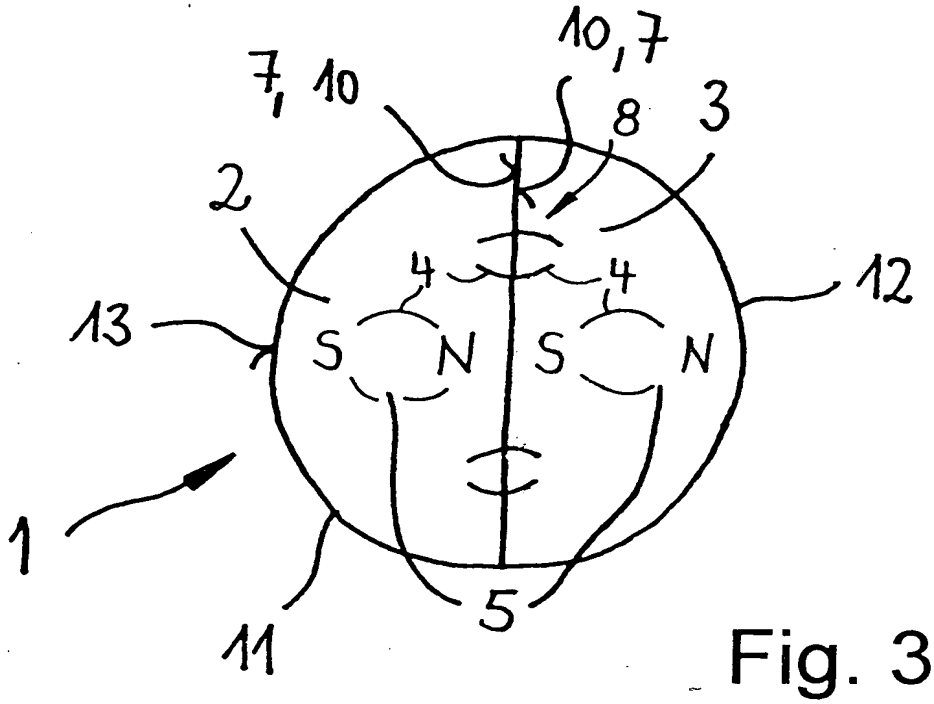

Fig. 3

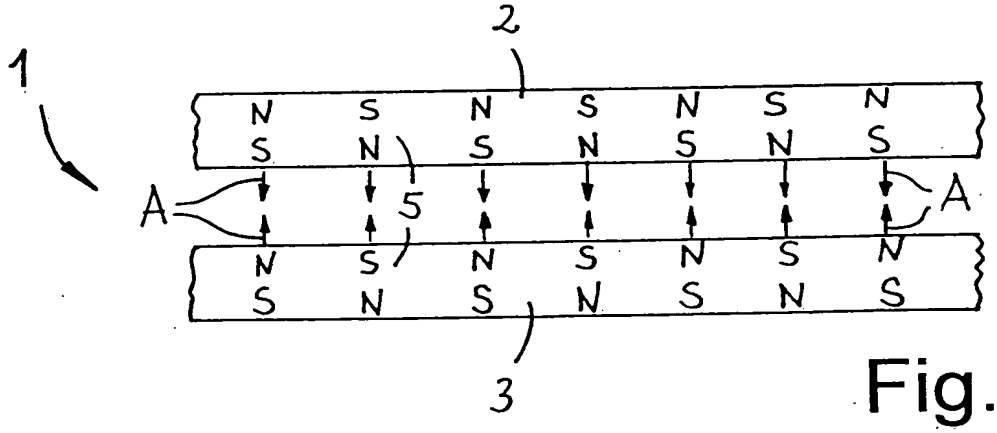

Fig. 4

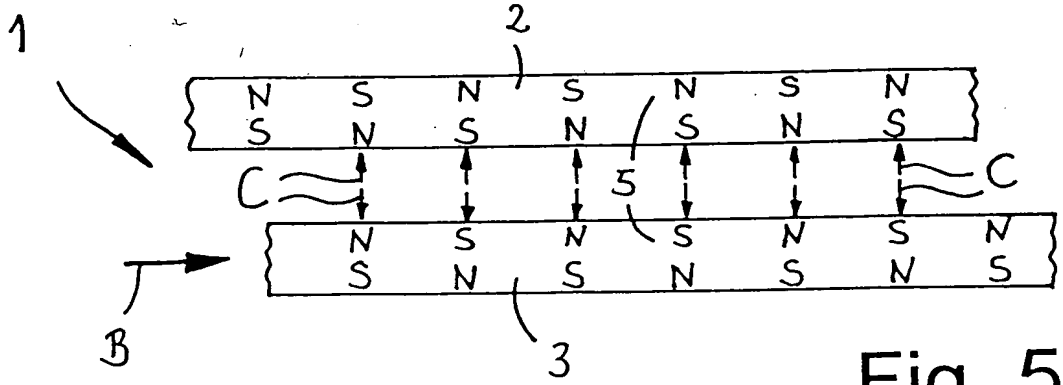

Fig. 5

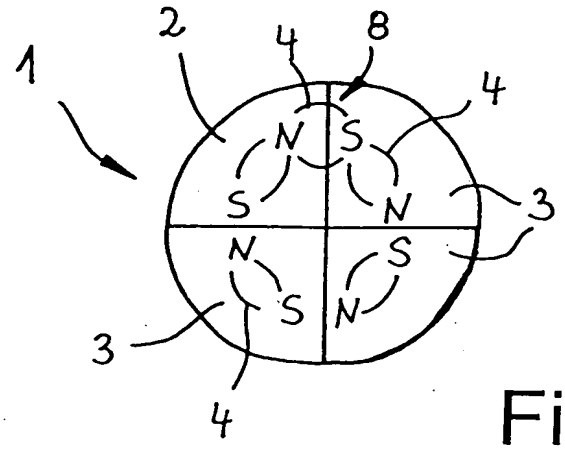

Fig. 6

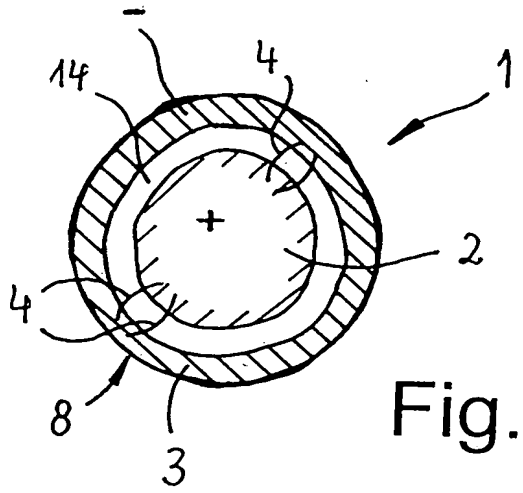

Fig. 7

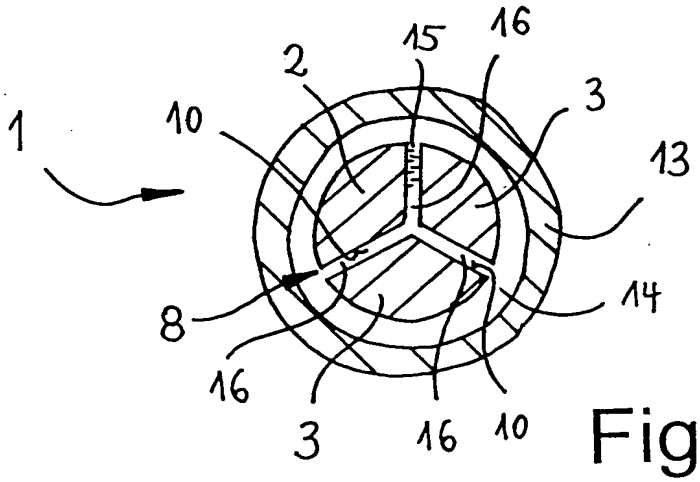

Fig. 8